

WHAT IS CLAIMED IS:

1. An apparatus for forming an organic layer on a substrate,
comprising:

a spraying device, the spraying device comprising:

5 at least one head unit; and

a plurality of heads alternately disposed in first and second sub
rows to form a zigzag pattern on the at least one head unit.

2. The apparatus of claim 1, wherein the at least one head unit
10 comprises a plurality of head units each formed in a corresponding row, and
wherein each head unit is shifted a horizontal distance from a previous head unit.

3. The apparatus of claim 1, further comprising:
a stage that supports the substrate.

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4. The apparatus of claim 1, further comprising:
a storage tank that stores organic material provided to the spraying
device.

20 5. The apparatus of claim 1, wherein each head comprises a
plurality of spraying nozzles.

6. The apparatus of claim 5, wherein each spraying nozzle
comprises a piezoelectric element.

7. The apparatus of claim 1, wherein the spraying device forms an angle with respect to a side of the substrate.

8. The apparatus of claim 7, wherein the angle is in the range of about $\pm 0^\circ$ to about $\pm 89^\circ$.

9. The apparatus of claim 3, further comprising a transferring device that transfers the stage in a first printing direction, a second printing direction that is opposite to the first printing direction, and a third direction that is substantially perpendicular to the first printing direction.

10. The apparatus of claim 9, wherein the spraying device is fixed.

11. The apparatus of claim 3, wherein the stage is fixed and the spraying device moves in a first printing direction, a second printing direction that is opposite to the first printing direction, and a third direction that is substantially perpendicular to the first printing direction.

12. A method of forming an organic layer on a substrate supported by a stage, comprising:

transferring the stage in a first printing direction while a spraying device sprays organic material onto the substrate;

transferring the stage in a non-printing direction that is substantially perpendicular to the first printing direction;

transferring the stage in a second printing direction that is opposite to the first printing direction while the spraying device sprays organic material onto the substrate.

5 13. The method of claim 12, wherein the spraying device does not spray organic material onto the substrate when the stage is transferred in the non-printing direction.

10 14. The method of claim 12, further comprising:
stopping the spraying device from spraying organic material when a first end of the substrate reaches the spraying device; and
stopping the spraying device from spraying organic material when a second end of the substrate reaches the spraying device.

15 15. A method of forming an organic layer on a substrate, comprising:
moving a spraying device in a first printing direction while the spraying device sprays organic material on the substrate;
moving the spraying device in a non-printing direction that is substantially perpendicular to the first printing direction; and
20 moving the spraying device in a second printing direction that is opposite to the first printing direction while the spraying device sprays organic material onto the substrate.

16. The method of claim 15, wherein the spraying device does not spray organic material onto the substrate when the spraying device is moved in the non-printing direction.

5 17. The method of claim 15, further comprising:
stopping the spraying device from spraying organic material when the spraying device reaches a first end of the substrate; and
stopping the spraying device from spraying organic material when the spraying device reaches a second end of the substrate.

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18. A method of forming an organic layer on a substrate using a spraying device, the spraying device comprising a plurality of head units each formed in a corresponding row, the method comprising:

shifting each head unit of the plurality of head units a horizontal distance
15 from a previous head unit; and
spraying organic material with the spraying device onto the substrate to form overlapping droplets of organic material on the substrate.

19. An apparatus for forming an organic layer on a substrate,
20 comprising:

a spraying device, the spraying device comprising a plurality of head units each formed in a corresponding row, each head unit being shifted a horizontal distance from a previous head unit.

20. The apparatus of claim 19, wherein each head unit comprises a plurality of heads alternately disposed in first and second sub rows to form a zigzag pattern on each head unit.